AMRAD NEWSLETTER

AMATEUR RADIO RESEARCH AND DEVELOPMENT CORPORATION

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Calendar

Meetings are normally held on the second Thursday of each month at the Dolley Madison Library in McLean, Virginia starting at 7 p.m.

AMRAD publishes six Newsletters a year (on the first weekend of each odd-numbered month). Authors are encouraged to submit their copy by the first weekend of even-numbered months for the next Newsletter. Please submit your copy to: Editor, AMRAD Newsletter, P.O. Box 6148, McLean, Virginia 22106-6148.

COMING MEETINGS:
THURSDAY DECEMBER 13
THURSDAY JANUARY 17
MARK YOUR CALENDARS!

Presentations at the June 1990 AMRAD Meeting

A Synopsis

by Dick Barth, W3HWN

The June 14th meeting was held at the Dolly Madison Library in McLean. The speaker was the ARRL's Washington area representative, Perry Williams, W1UED. This was his second visit to AMRAD.

Perry began with a brief explanation of his title – Washington Area Coordinator – and why he is called that rather than "VP for government relations" or one of the more usual euphemisms for a lobbyist. The reason? His job is in fact to coordinate the efforts of Washington area hams, all of whom are actual or potential members of the ARRL team. Some are in places where it is helpful to have hams. A number of hams are members of the Interdepartment Radio Advisory Committee, or IRAC, which helps decide the use of the radio bands by government agencies. Other hams work for the FCC, which makes rules for amateur and commercial radio users. Having people in these positions who are aware of ham sensitivities often makes it possible for the League to receive an "early warning" of trends that have a potential impact on amateur radio. Perry gave as an example the development of the wind profiler, a new type of radar that is aimed vertically into the air to measure wind movements. It is very useful in weather prediction and improving safety and economy in aviation.

Perry announced that whatever title he uses, he is really and truly a card-carrying lobbyist. Producing the card, he said it allows him into the Capitol building through non-public entrances. It lets him stay after hours when he needs to speak to a member of Congress, and it lets him into a lot of government buildings whose only entrance requirement is a government ID.

One of Perry's major Washington activities is making frequent contact with the FCC. He has found himself received better than he originally expected, and is able to see Commission staffers freely. This access allows him to discuss "issues," such as the 220 MHz band. He can also check the status of various dockets, push for enforcement action against some of the bad actors in the ham bands, and also suggest reasonable treatment when some anonymous complainant presses for "quiet hours" (i.e., hours during which a ham would be forbidden from transmitting) against a ham without trying to resolve the problem in other ways. Perry also pushes for rules changes permitting new technologies, such as spread spectrum in the ham bands.

ARRL is trying to convince regulators and legislators that the amateur bands are the "public parks" of the radio spectrum. Just as good land planning requires the dedication of a certain amount of "green space," so does sound spectrum planning require availability of spectrum for free, noncommercial use by the public. Radio control, CB and GMRS are other examples of this type of operation.

Perry remarked that one possible effect of a code-free license is the loss of the common culture created by the almost universal pathway of hams through the novice/tech/general classes.

A number of government agencies have an interest in and an impact on the radio spectrum. Perry mentioned that a ham in the Interior Department is in effect the FCC for the U.S. Trust Territories. The Agriculture Department's Forest Service owns a lot of hilltops which are handy when you're trying to build a repeater. A ham is on the staff of the Senate's intelligence committee. Hams are active in the Red Cross, which uses radio in emergency activities, and in other non-profits like VITA, Volunteers in Technical Assistance. VITA is pushing for a satellite system to be used for technical assistance to the third world.

Perry is asked most often about his dealings with Congress. He gave as an example the issue of license fees. Last summer and fall Congress decided that everybody who wasn't already paying license fees would have to do so. The House was talking about a thirty dollar fee every time a ham filed a Form 610, while the Senate wanted $35. An STA would be $35, and waivers to the rules would have cost $105 per station, per rule. The House wanted to tag everybody with a fee, while the Senate decided to exempt public services (police, fire, etc.) and non-profit organizations. The League began targeting the districts of people on significant committees – budget, energy and commerce, and the like. Hams in those districts wrote their representatives, either to ask for help or to offer thanks to those providing it. With efforts like these, the tide was turned. The occurrence of Hurricane Hugo and an earthquake in the districts of key politicians didn't do any harm either.

The 220 MHz issue remains active. From the 1940's until about 1958, hams had exclusive use of the 220-225 MHz band. In 1958 the Defense Department expressed a need for bands in which to operate new military radars, and the 220 MHz band was one of those which appeared best suited. The Office of Defense Mobilization took control of these bands under the President's war emergency powers, with hams sharing them on a secondary basis. This arrangement worked admirably for several decades. The presence and importance of big military radars served to keep spectrum poachers away, and hams near a radar operated by simply using a different part of the band than it did. These arrangements were formalized for the 220 and 420 MHz bands at the 1959 WARC.

In the seventies, things changed in the 220 MHz band and WARC 79 changed the rules. In ITU region two – the western hemisphere – radars continued as primary until 1 January 1990, after which no new radar systems could be installed. Other services were to be introduced. Domestically, the FCC had developed an interest in narrow-band mobile technologies such as amplitude compandored single sideband (ACSSB) which promised to allow additional users into already crowded mobile bands. Unfortunately, the mobile bands were already full of people using standard 25 KHz FM channels which are incompatible with ACSSB. The Commission then decided to find some virgin spectrum in which to introduce narrowband systems. Thus the snatch of the 220-222 MHz band began, despite complaints from Congress, the military, the government's National Communications System and any number of private organizations and individual hams. The NCS, which is interested in the survivability of national communications saw the value of the 220 MHz packet network which was being built at no expense to the government. A spiderweb configuration such as is used by amateur packet systems provides excellent survivability, since the loss of any part can be handled by simply rerouting traffic around the missing links.

The FCC has begun planning for mobile use of the 220-222 MHz band but expects to permit continued amateur use until those plans are complete. Meanwhile, the issue is scheduled for oral argument before the Court of Appeals for the DC Circuit on November 16th, 1990. It is not clear whether the Commission, once it has finished its rulemaking process, will wait for the Court's decision. The ARRL is therefore trying to get the Congress to intervene, but not with outstanding success. The United Parcel Service (UPS) is one of the primary beneficiaries of the reallocation. It is also a very large contributor of PAC money to political campaigns. No evidence of a connection has yet been found, but people are still looking and wondering.

One point the ARRL is pressing is the apparent subversion of the FCC's claimed purpose in reallocating the band, which was to create an empty band for the introduction of narrowband channels. A number of the band's prospective commercial users argued that the FCC should instead authorize wider channels for transmission of digital data. This arrangement is, of course, much like the amateur digipeaters that would be uprooted when commercial interests took over. ARRL's Reply Comments in the FCC proceeding called this tactic "bait and switch." The same argument may be used before the court.

II-Morrow, the Seattle company that was bought by UPS to be their radio manufacturing arm, is reported to be having trouble making the ACSSB pilot tone sufficiently stable at 220 MHz. ACSSB may not be practical in this band. II-Morrow, by coincidence, was formed by the son of the Morrow who used to make ham gear some years ago.

In response to a question about the 902-928 MHz band, Perry pointed out that hams are several layers down in the pecking order there. At the top of the heap is ISM – the Industrial, Scientific and Medical service, which consists of such things as diathermy machines, microwave ovens and induction heaters. They are not subject to interference, but other services can't complain (or at least it won't help) should ISM cause interference to them. Next comes government radiolocation with a primary allocation. Further down, with secondary status, are government mobile operations followed by non-government Automatic Vehicle Monitoring (AVM) systems. AVM systems are used for several purposes, such as tracking stolen vehicles and keeping tabs on delivery trucks. Finally, there are hams. Hams in Los Angeles have worked out a plan for peaceful coexistence with AVM operators, and the same approach may be followed elsewhere where significant ham use and AVM must live together.

902-928 MHz is one of the ISM bands in which recent FCC rules changes permit increased power levels to Part 15 devices – non-licensed gadgets such as electronic toys and garage door openers.

Perry was asked for the Commission's reasoning in changing the League's code-free license proposal into a plan to eliminate the novice and/or tech license classes. The answer was "administrative convenience" and budget limitations. The software the FCC now uses to track amateur licenses has room for six classes of license, but the one labeled "communicator" has never been tested and they're not sure it will work. To introduce a new license class without getting rid of an old one might require rewriting the programs. Perry is optimistic about saving the Novice and Technician licenses. □

Speech Synthesis

Making Computers Accessible to the Blind

By Holly Turri, N3FCA

Introduction:

For years, getting computers to interact effectively and innovatively with humans has been a scientist's dream. Speech and written communications are said to be the main ways we are separated from other life forms. Therefore, getting computers to talk to us, and getting them to recognize our language are goals of many. Speech synthesis is a whole sub-specialty of computer science – one which many of us do not understand. This article's purpose is to be a general introduction. Other more esoteric and technical presentations may follow.

A good working definition of speech synthesis is taking the output of a computer's screen, printer or communications port and translating it into verbal signals. This is done electronically using a specially designed chip and software.

Types of Speech:

Here are two basic types of speech produced by these devices: fixed vocabulary and phonemically generated output. As the name implies, fixed vocabulary synthesizers have particular words programmed into them. Some are very sophisticated with many words, but their vocabulary can not readily be advanced or changed. Their speech is usually very clear and understandable. An example would be the voice you hear on and would and Icom radios, or your answering machine.

Phonemically generated speech is extremely fascinating, so most of our attention will be focused on it. The synthesizer looks at the material being sent its way and makes an attempt to read it. Using a speech algorithm containing many of the most commonly used rules of pronunciation and punctuation, the computer attempts to "read" whatever is sent its way. The instruction set also contains rules for speech pronunciation and inflection. The complexity of the algorithm will determine what quality of speech you will hear. One low end speech board has 650 rules of pronunciation. Recently, it was upgraded to over 2,000.

Types of Synthesizers:

There are two types of synthesizers on the market today. External synthesizers usually plug into either the serial RS-232 port, or, less commonly, the parallel port. Output from computer programs is routed down the cable to the synthesizer. In other words, it acts like a type of modem.

Internal speech synthesizers are boards which fit into computer slots just like any other peripheral board such as a clock calendar card. They capture information off the system bus as would any other device.

Another less common type of internal "synthesizer" lets you produce speech with a computer's sound chip. Using software, speech is generated. This is the speech sometimes heard on Commodore 64's Software Activated Mouth (SAM) program, or in the MacIntosh.

Commonly Used Chips

Most low end speech synthesizers can be divided into two families. The Echo (Street Electronics) and the Votrax. The Echo uses technology from Texas Instruments. It has inflection and a tinny sound.

The Votrax type of synthesizer uses the SCO-1 chip. It has a flat sound without inflection. You may be familiar with the Type'n'Talk or the Personal Speech system. Both of these external systems use this technology.

Recently Artic Technologies has utilized the SSI-263 chip which is similar in sound to the Votrax but has many more rules of pronunciation, and also has inflection.

Software:

Most speech synthesizers come with a software disk. It is responsible for routing the computer output to the proper port or slot. In other words it is like a guide and interpreter.

Price Classes and What they mean:

As in many other of life's dealings, in speech synthesis, "you gets what you pays for." High end synthesizers like DecTalk have extensive algorithms and expensive price tags. They have very clear voices, although some say they have slight accents, good inflection, and a very human sound. DecTalk has a wide range of male and female voices. These are great little devices, but at around $3,000, are a little out of most people's price range.

Low end devices (e.g., Echo, Votrax, and Artic products) have less extensive algorithms and less complex chips. Hence they have a robotic sound and less clear pronunciation which some find difficult to comprehend at first. However at from $99.00 to $400.00 they are much more affordable.

History of Speech and Computers:

Originally speech was a dream of artificial intelligence experts. It was time consuming to produce and very expensive.

However, as prices of chips declined, and things were miniaturized, speech became more and more affordable.

In the mid 1970's people began experimenting with speech and blind people. It was reasoned that if computers' output were translated either into braille or spoken form, this revolution could benefit this population. So, like the typewriter, a device not especially manufactured for blind people has dramatically changed lives and opened worlds of opportunity.

Because of the many mechanical considerations, braille always has been more expensive to produce than low end speech. Today, the low end braille printer runs for $2,300.

Brands of Computers:

Originally, speech appeared in dedicated terminals or hardware boxes which sat next to these devices. The world of mainframe and minicomputers was opened to blind people. However, as the microcomputer revolution began,

many wondered why these couldn't be used by blind people as well.

Almost every computer has been made to speak. However, there are two main areas, which still reflect continuing development today—the Apple and IBM families.

Speech and Apples:

The Apple II computers were the first with speech to gain wide acceptance. many used the Echo II speech board, manufactured by Street Electronics. However, there was one main problem. Due to the copy protection schemes of Apple and its software manufacturers, many commercially produced programs would not run. This was because the memory locations of speech and of the copy protection conflicted.

To surmount this difficulty commercial programs were modified, and special adaptive software was developed. This opened the world of telecommunications, error free typed documents, and databases to blind individuals. However, it was only a partial opening. With the advent of the PC family, the door was thrown wide open.

The IBM Family

The PC's first development in speech was around 1983. Now, it is becoming the standard in home and business computers for blind people, just as with their sighted peers. The memory conflict has largely been eliminated because of the flexibility of I/O that DOS and the extra memory give the user. Therefore the blind ham with an IBM can use the same Terminal Program to operate his packet station as his print reading counterpart.

Screen Reading Software

Earlier in this article we discussed speech synthesizers and hardware. Now, we'll talk about the special screen reading software which blind people use. With few exceptions, the unadorned speech synthesizer will read whatever comes its way, but won't allow the user to reread things, or review things which were difficult to understand.

The Echo II was the first synthesizer bundled with its own screen reading program. Other synthesizers depend on third parties to write software to make them function effectively in a screen reading environment.

These programs allow the user to view the screen a line, word, or character at a time. A character's case can be indicated. Also, special provisions have been made by some vendors to track special cursors in programs, and to indicate highlighted, inverse, and flashing video text.

Many programs control these functions with keys on the keyboard. Some manufacturers have used external keypads connected to the computer as controllers.

This screen reading is done by some manufactures in a "review" mode, where the page is held in stasis and the person can roam around the text without fear of damaging it. Others, while using this as an adjunct, also allow the user to use the "applications" mode. In other words, the user can remain in the text and interact much more freely.

Future Developments

Recently the IBM corporation has announced the development of a new screen reading package which will allow blind people to utilize the PS/2 family. However, it will only work with external synthesizers. Companies manufacturing internal boards must develop new products to interface with the microchannel technology.

Future developments with neural computers should greatly enhance blind people as well as sighted individuals. Speech recognition, which is another technological development, should also have an effect. Many people mistakenly think that speech recognition is the panacea for blind people. However, many blind people are taught typing from an early age and are more prepared to communicate with computers than is the average sighted individual. Continuing to improve speech synthesis is of far more significance.

Conclusion:

Speech synthesis is a very significant sub-specialty in computer science. Originally the product of laboratory esoterica, it is now being utilized in everything from cars to talking clocks.

Using low end speech synthesizers, the world of computers has been opened to blind people. This development is as significant as braille's invention over 200 years ago. In the past, less than 1% of printed material was accessible to blind people. Now, computer databases with newspapers, stock quotes, and shopping are just a keystroke away.

Even more importantly, only 30% of blind adults of employable age now work. Through enlightened informed managers, this barrier should be broken as well.

This article is being written on a Toshiba 1100+ computer using the Artic Speech board and Artic Vision screen reading software. The word processor is Word Perfect, the same commercially manufactured program that you or your secretary uses. □

The President's Ramblings

Elsewhere in this issue you will find the membership list sorted by callsign and by last name. Please take a moment to check your name, address and telephone numbers.

The January 1990 meeting will exceptionally take place on the third Thursday of the month, that is January 17, because of redecoration work being carried out at the Dolley Madison Library during the first two weeks of January. See you all on the 17th!

A reminder that the December meeting is the one during which we conduct our business. Elections will be thus held on December 13 to choose two Directors and two Alternate Directors. Your opinion counts (after all, it is *your* AMRAD), so if you don't like what AMRAD is presently doing, this is your opportunity of a lifetime: run for one of the Directorships, and start altering the course of history!

73! de André N4ICK □

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The purpose of AMRAD is to: develop skills and knowledge in radio and electronic technology; advocate design of experimental equipment and techniques; promote basic and applied research; organize technical forums and symposiums; collect and disseminate technical information; and provide experimental repeaters.

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Meetings are held on the second Thursday of each month at 7:00 P.M. at the Dolley Madison Library in McLean, Virginia. If the second Thursday is a holiday, an alternate date will be announced in the newsletter. Except for the annual meeting in December, meetings are reserved for technical talks—not business.

WD4IWG Repeater

WD4IWG/R is an open repeater for FM voice and digital communications, especially for experimental modes. It is located in McLean, VA. It features an autopatch available to licensed members. Frequencies are: 147.81 MHz in and 147.21 MHz out. The repeater director is Jeff Brennan, WB4WLW.

Westlink Report

The Westlink report is aired every Sunday night at 8:00PM on the WD4IWG repeater.

Data Address

Our CompuServe/Micronet number is [72345,1050]. Our E-Mail address is lkestel@gmuvax2.gmu.edu.

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